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## Alaska Department of Environmental Conservation

# AIR QUALITY MODELING CHECKLIST

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*ADEC is providing this checklist to assist permit applicants who are required to conduct an air quality modeling analysis under 18 AAC 50.310(c)(5), (d)(2), (g) and/or (n). Applicants do not need to submit this checklist with their application.*

*The checklist indicates the items that applicants <u>typically</u> need to submit in order for ADEC to adequately review their analysis. Modeling assessments are dependent on the approach and assumptions used to characterize the emission sources and dispersion characteristics. Therefore, applicants will also need to provide a written description of the modeling tools and assumptions, all input data, the modeling results and whether the results indicate compliance with the ambient air quality standards and increments (as applicable). The checklist also provides a recommended format for providing this information.*

*ADEC encourages applicants to submit a modeling protocol for review and approval well in advance of submitting their modeling analysis. Modeling protocols help identify potential modeling concerns before you spend considerable time and money on a modeling demonstration. This checklist also provides an outline of the potential issues applicants should discuss in their protocol.*

*Some sections of the checklist may not be applicable to the applicant's project. In these situations, the applicant should indicate the section is not applicable (provide justification, as needed to explain why), rather than ignore the topic in the modeling protocol/report.*

*Applicants should contact ADEC's Construction Permit Group at (907) 465-5100 if they have any questions regarding modeling requirements or recommendations for their specific permit application.*

### Check each box upon completion of the indicated item.

# Report Narrative

☐ **Project Description**

*Provide an overview of the project: project purpose and scope, general geographic location, types of emission sources and operating scenarios, and the pollutants/averaging periods evaluated.*

☐ **Regulatory Basis and Project Classification**

*Describe the regulatory basis for modeling: include the facility and project classification according to 18 AAC 50.300. Provide the distance to the nearest Class I and non-attainment areas. For PSD projects, include a summary table comparing the total increase of pollutant-specific emissions with the PSD emissions significance levels.*

☐ **Modeling Protocol**

*If a modeling protocol was submitted and approved, include the protocol and approval letter as an attachment to the modeling report. Note: it is not necessary to repeat the information contained in the protocol in the modeling report. However, make certain any changes to the protocol have been clearly identified, if applicable.*

**Existing Environment (Applicable for sources subject to PSD only)**

☐ Describe the approach, results and conclusions of the analysis conducted to compare the project impacts to the pre-construction monitoring thresholds

☐ Describe the ambient concentrations measured in the pre-construction monitoring program and its implications

## Model Selection

*Provide a description of the general modeling approach (e.g., project impact vs. cumulative impact) and highlight any unique items. Submit all electronic modeling files to ADEC with the modeling report.*

☐ Identify the computer dispersion model(s), including version number that was used in the modeling analysis.

☐ Note any modifications made to the model source codes.

   ☐ Make certain copies of the source code, executables, and EPA approval (if previously approved) are submitted to the Department.

   ☐ Make certain the changes are described in the report.

☐ Identify the land use option (dispersion coefficient) you assumed (e.g., urban or rural).

☐ Identify any post-processing models/algorithms used to predict ambient concentrations or refine the analysis.

☐ Reference the approval letters issued by the EPA or ADEC regarding the actual model/algorithm.

☐ List the time-averaged pollutants modeled.

☐ Include any other modeling considerations.

*Discuss any other modeling parameters or considerations used in the analysis. Examples are provided below.*

☐ Dry Deposition: If you used an algorithm to account for gravitational settling (dry deposition) of particulates, document your deposition modeling assumptions (e.g., "surface roughness") and approach.

☐ $NO_2$ Modeling: Describe your approach for estimating the NO to $NO_2$ conversion (e.g., full-conversion, 0.75 ARM, OLM, etc).

☐ If the *Ozone Limiting Method* was used, describe where the data was obtained; provide an electronic copy of the ozone data, and obtain Department approval for use of this data in this manner.

## Meteorological Data

*Describe the meteorological data/assumptions used in the modeling analysis, including the items listed below (as applicable). All meteorological data files should be submitted to ADEC as part of the modeling analysis such that ADEC can recreate the model-ready input file(s). The report should fully document the data processing steps such that the model-ready data files are repeatable.*

Screening Meteorology

☐ Describe the EPA-approved screening model.

☐ Describe the screening meteorology if not using an EPA-approved screening model.

NWS Meteorology

☐ Describe the National Weather Service (NWS) meteorology used in the analysis.

☐ Specify the surface and upper air station location, years used, where you obtained the data and how the data was processed.

Site-Specific Meteorology

☐ Describe the site-specific surface data.

   ☐ Indicate the approval letter and date, if using previously approved data by the Department.

   ☐ Describe where, what and how this data was gathered.

   ☐ Document periods of missing data and whether they were filled in (if so, how).

   ☐ Indicate if the data set has been approved by the Departments' Air Quality monitoring staff or previously accepted by ADEC for regulatory modeling of the facility.

   ☐ Describe what upper air data you used and how you obtained the electronic data.

☐ Describe what processing was conducted for model input.

*All non-EPA processing programs should be submitted to ADEC for review and approval.*

☐ Provide a wind rose illustrating the surface data.

☐ Provide a frequency distribution of stability class (*not applicable with AERMOD*).

☐ Provide the basis for your selection of land use classifications if boundary layer parameters were created by the meteorological processor.

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### Receptor Grid

*Describe the receptor locations, including the items listed below (as applicable).*

☐ Include or reference a scaled map(s) or aerial photograph(s) showing the location of the modeled receptors in relation to the sources. (Note: may not apply for screening analysis using linear models such as SCREEN3)

☐ Provide receptor coordinates along the axis.

☐ Ensure the receptor coordinate system is consistent with the source coordinate system.

☐ If the receptors are identified by UTM coordinates, ensure they are specified in the same datum (e.g., NAD27 or NAD83) as the source locations.

☐ Ensure actual terrain elevations are used for each receptor.

☐ Indicate the source and scale of the terrain elevations (e.g., 7.5' USGS maps, 1:24,000 DEM data, 1:250,000 DEM data).

☐ Ensure Cartesian (grid) receptors are used (required when modeling more than one stack).

☐ Ensure that the receptor grid is consistent with the location and spacing described in an approved modeling protocol.

☐ Ensure the receptor grid has sufficient density to identify the maximum concentration (i.e., is the grid density commensurate with the concentration gradients). *Note: in downwash situations, this may require the use of a 25-meter receptor grid.*

☐ Ensure receptors are included for publicly accessible locations (ambient air) within the facility.

### Facility Emissions and Release Parameters

*Provide the facility emissions and stack parameters used in the modeling analysis, or reference the emissions and stack parameters provided in Form F or the equivalent.*

☐ Ensure the report presents or references a source-by-source emission inventory of all pollutants for all new and/or modified sources.

☐ Describe or reference all facility source release parameters (i.e., stack height and exit diameter, actual exhaust flow rate, and exit temperature).

☐ Ensure the modeled sources are consistent with the project description, including fugitive sources.

☐ If this project is a north slope oil field project, ensure that intermittently used oil filed support equipment and construction phase air emissions are consistent with AWQ 03-016 and AWQ 03-017.

☐ Identify all non-road engines, if applicable.

☐ Ensure all operating scenarios modeled. For example, if modeling flares make certain both the pilot purge gas operation and flaring events are modeled.

☐ Ensure maximum modeled emission rates agree with the requested permit emission levels in ADEC Form F.

☐ Provide a cross-reference table which correlates the model ID with the permit ID of each emission unit.

☐ If the primary emission sources can run at variable operating loads, provide the load screening analysis.

☐ Ensure the emission rates, exhaust flow rates, and exit temperatures used in the compliance modeling reflect those resulting in maximum impacts identified in the load screening analysis.

☐ If the facility has stacks with weather caps or non-vertical discharges, ensure the stack exit velocities and modeled stack diameters have been adjusted in accordance with current EPA/Department guidance to simulate reduced plume momentum. Make certain to also report the actual stack parameters so the Department can verify the virtual parameters.

☐ Ensure that startup and shutdown emissions been addressed, if applicable.

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### Downwash

☐ Ensure all facility stacks are not modeled at heights exceeding Good Engineering Practice Stack Height (GEP).

☐ If stacks are less than GEP, ensure that building downwash is accounted for in the modeling analysis.

☐ Include cross section diagrams showing buildings, stacks, and signature of person responsible for drawing (not required, but can be helpful).

☐ For an existing source, include photographs of buildings and stacks (not required, but can be helpful).

☐ Ensure same coordinates and base elevations are used in BPIP as in the modeling files. *This is helpful to ADEC during the review because the graphics software which overlays the building and source data on the receptor grid requires consistent units between the two files.*

☐ Ensure cavity zone impacts have been addressed.

### Significant Impact Analysis

*The report should present a comparison of project emissions with the significant impact levels to determine whether a full impact (cumulative) analysis is required.*

☐ Ensure all applicable pollutants been considered.

☐ Ensure that the maximum model-predicted impact was used for comparison with modeling significance levels.

☐ Make certain the largest distance of all time-averaged pollutants is used in determining the radius of impact.

☐ Present a comparison of the maximum modeled facility impacts with the Significant Air Quality Impact Levels (SILs) shown in Table 6, 18 AAC 50.310(d)(2).

*The values in Table 6 only apply to NAAQS and Class II increment assessments. Please contact ADEC regarding the appropriate SILs for Class I assessments.*

*If the maximum model-predicted concentrations do not exceed the SILs, then skip to Background Data.*

*If the maximum model-predicted concentrations exceed the SILs, then an incremental analysis is required, (not just for PSD major sources), as per 18 AAC 50.310(n).*

### NAAQS and AAAQS Analysis

*Describe other local emission sources included in the cumulative impact analysis, present the modeling results, and indicate whether they demonstrate compliance with the ambient national and Alaska air quality standards, as applicable.*

☐ The report should document whether other local emission sources are present and if they are included in the modeling analysis.

☐ The report should include a description of other local emission sources including their emission rates and stack parameters; how they were obtained; and whether any changes were made to these parameters.

☐ The maximum impacts should be summarized in clearly labeled tables including a comparison with applicable national and Alaska ambient air quality standards.

☐ Make certain to include ambient background levels in the analysis for comparison against ambient standards.

☐ The report should include or reference a scaled map(s) or aerial photograph(s) showing the location of the maximum ambient impact(s). *(Notes: 1. May not apply for screening analysis using linear models such as SCREEN3. 2. May not apply for an analysis demonstrating the facility impacts are below the ASignificant Concentrations@ in Table 6 of 18 AAC 50.310(d)(2) or corresponding federal Class I significance thresholds, as applicable.)*

☐ Ensure impacts are evaluated on any nonattainment area located within 10 kilometer of the source.

### Increment Analysis

*In Alaska, all classified sources emitting PM10, NOx, or SO2, must perform a PSD increment analysis, not just those subject to PSD, as per 18 AAC 50.310(n).*

☐ Make certain you include an increment analysis.

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☐ The report should include a discussion of major and minor source baseline dates.

☐ The report should include a discussion of area classification for PSD purposes.

☐ The report should present a discussion of which sources at your facility were included in the increment inventory with respect to the major and minor source baseline dates.

☐ Make certain all emissions and stack parameters associated with increment consuming sources at your facility are described or referenced.

☐ The report should present a discussion of other increment consuming sources with respect to the major and minor source baseline dates and how the information was obtained, and whether any changes were made to these parameters.

☐ The report should present a discussion of area or mobile sources included in the increment inventory (as applicable).

☐ All baseline emissions should reflect Aactual@ emission rates instead of Aallowable@ rates.

☐ The report should include a comparison of model results with Class I and Class II PSD increments for each time-averaged pollutant.

☐ The report should include a summary of the controlling receptor locations and elevations.

## Background Data

*Background concentrations account for the contribution of non-modeled sources to total-predicted impacts.*

☐ Describe how the background concentrations were obtained and the values used in the modeling analysis *(Note: May not apply if facility impacts are below the ASignificant Concentrations@ listed in Table 6 of 18 AAC 50.310(d)(2) or the draft federal Class I significance thresholds, as applicable.)*

## Additional Impact Analysis (Applicable for sources subject to PSD only)

*Discuss the four elements of the additional impact analysis: (1) growth, (2) ambient air quality impact analysis due to growth, including construction, (3) soils, vegetation, noise and odor impacts, and (4) visibility.*

☐ Construction impacts.

☐ Impacts due to growth.

☐ Impacts on soils.

☐ Impacts on vegetation.

☐ Noise impacts (required under 18 AAC 50.315(e)(3)(c)).

☐ Odors impacts (required under 18 AAC 50.315(e)(3)(c)).

☐ Visibility analysis (not to be confused with the Class I area visibility analysis).

☐ Make certain the visibility analysis is performed in accordance with EPA's *Workbook for Plume Visual Impact and Screening Analysis (revised)*, as adopted by reference in 18 AAC 50.035.

## Class I Area Analysis (Applicable for sources subject to PSD only)

☐ Ensure that all Class I Areas that could potentially be impacted by the project were identified.

☐ Identify the model(s) used in the Class I area analysis.

☐ Send a copy of the modeling protocol, permit application, and modeling analysis to the FLM.

☐ Make certain the visibility analysis was consistent with the FLAG Phase I Report guidance.

☐ Make certain acid deposition was analyzed in a method consistent with the FLAG Phase I Report guidance.

☐ Make certain the analysis includes an assessment of PSD Class I increments and that the results are less than the FLM levels of concern and PSD Class I increments.

### Additional Reporting Information for Facilities Near Non-Attainment Areas

*For facilities classified under 18 AAC 50.300(e) or 18 AAC 50.300(h)(9), the analysis must demonstrate that the expected maximum emissions of the nonattainment air contaminant will not cause ambient concentrations that exceed the concentrations in Table 6 in 18 AAC 50.310(d)(2) at any location that does not or would not meet the ambient air quality standard for that contaminant.*

☐ The analysis demonstrated this.

# Figures, Maps, Electronic Data, etc

*Note: Figures and maps should be inserted with the narrative, when possible. Large maps, data CD's, etc., should be referenced in the text and included as appendices.*

☐ The report should include or reference a scaled site plan showing:
- ☐ Emission Release Locations
- ☐ Nearby Buildings
- ☐ Cross Section Directions (if applicable)
- ☐ Property Lines
- ☐ Fence Lines
- ☐ Roads
- ☐ Coordinates (preferably UTM) shown on axes. *If UTM coordinates are used, the datum should be specified (e.g., NAD27 or NAD83).*
- ☐ Origin of coordinate system (if not UTM)
- ☐ North arrow (true north)
- ☐ Other pertinent items (as applicable)

☐ The report should include a topographic map or aerial photograph showing :
- ☐ Source Location
- ☐ Facility Boundaries
- ☐ Terrain Features (contour lines)
- ☐ Nearby Buildings, Roads, and Adjacent Facilities
- ☐ Meteorological Tower (if applicable)
- ☐ Pre-construction Monitoring Site (if applicable)
- ☐ Nearby Class I and Sensitive Class II Areas

☐ Provide an electronic file of the facility plot plan (e.g., CAD, GIS, or other mapping file), if available.

☐ Provide all electronic modeling files, including:
- ☐ "Readme" textfile that describes the submitted files, including any files that are provided in a compressed format.
- ☐ Model input/output files (pollutant, visibility, acid-deposition, etc, as applicable)
- ☐ BPIP input/output files
- ☐ Meteorological files
- ☐ "Executable" modeling program, if non-EPA version
- ☐ Post processing programs and files (including spreadsheets)

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